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The influence of Triton X-100 on protolytic properties of aminomethylated calix[4]resorcinarene and its interaction with copper(II)

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Abstract

The influence of Triton X-100 (concentration 5 mM) on acid-base properties of aminomethylated calix[4]resorcinarene (H8L) containing alkyl (R1 = C11H23) and dimethylaminomethyl (R 2= CH2N(CH3)2) substituents and interaction of H8L with copper(II) is studied by potentiometry and mathematical simulation of equilibria in solutions. It is found that the presence of a nonionic surfactant favors the aggregation of H8L (the degree of aggregation is higher than four), whereas, in 80% isopropanol at the same pH ≈ 10.2, a neutral species of the compound is only dimerized. The addition of Triton X-100 affects both the composition and stability of formed copper(II) complexes. The fraction of the highly charged tetranuclear [Cu 4(H4L)]4+ complex sharply decreases. The formation of a large amount of [Cu(H7L)]+ complex appears to be preferable compared to [Cu(H8L)2]2+ complex containing two ligands in the coordination sphere (pH ≈ 5.7). An enhancement of the acidic properties of protonated species of the compound and a decrease in the apparent constants of H8L-copper(II) complex formation in Triton X-100 solutions compared to those in water-alcohol solutions are attributed to the formation of mixed micelles.

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